Magnetic Design Meeting Update

Agenda for 12 March meeting:

Topic I - Low Beta Quadrupoles	(20min)
Ramp rate studies with LHC magnet	- Sandor
Dealing with the ramp rate issue	- Sasha
Cold mass end design update	- Fred
Topic II - Correction Elements	(10min)
BNL design/current limits	- Jim
Fermilab design update	- Vadim
Topic III - HTS leads	(10min)
Status of MTF test	- Sandor
Procurement plan update	- Jim
Topic IV - BTeV Test Stand	(10min)
Design status	- Tom P

Low Beta Quadrupoles

Ramp rate dependence of recent LHC quadrupole (mqxb10, mqxb12) at ~4.5-4.6K reviewed

Worst case ?1000A below operating point at Tevatron ramp rate (quench at about 8500A at 150A/sec)

- not a problem for LHC due to
  - low ramp rate
  - 1.9K operation (cooling conditions)

Two cold masses exhibited different ramp rate behavior:

- sensitivity at low ramp rates differ

Different conductor used in the cold masses

Low Beta Quadrupoles, cont.

- Quench origins not clear in recent data – minimal voltage taps and little quench antenna information due to fast development
  - review of quench origins vs. ramp rate in LHC prototype and short models
- Internal splice design a suspect: potentially large eddy current effects coupled with relatively poor cooling
- Differences due to cable/conductor properties?
  - Further studies needed on subsequent quadrupoles at 4.5K
- Can consider roll-off of ramp rate near flattop...

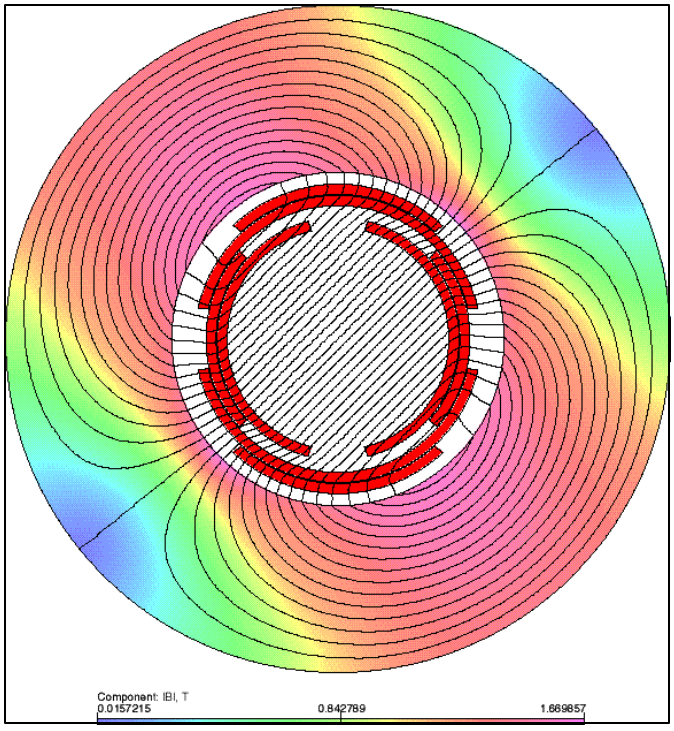
Correctors

Vadim Kashikhin presented an update on the cos(n?) corrector design

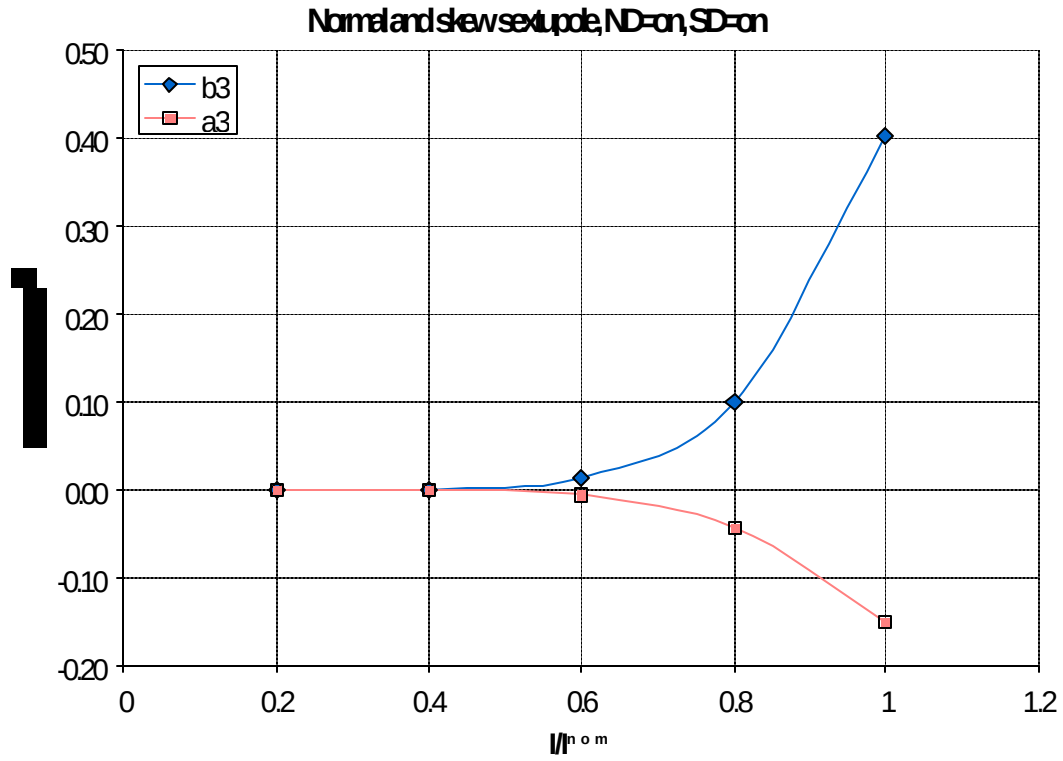
The 'worst case' saturation configuration – horizontal and vertical dipole correctors at full field – was studied for iron statuation effects.

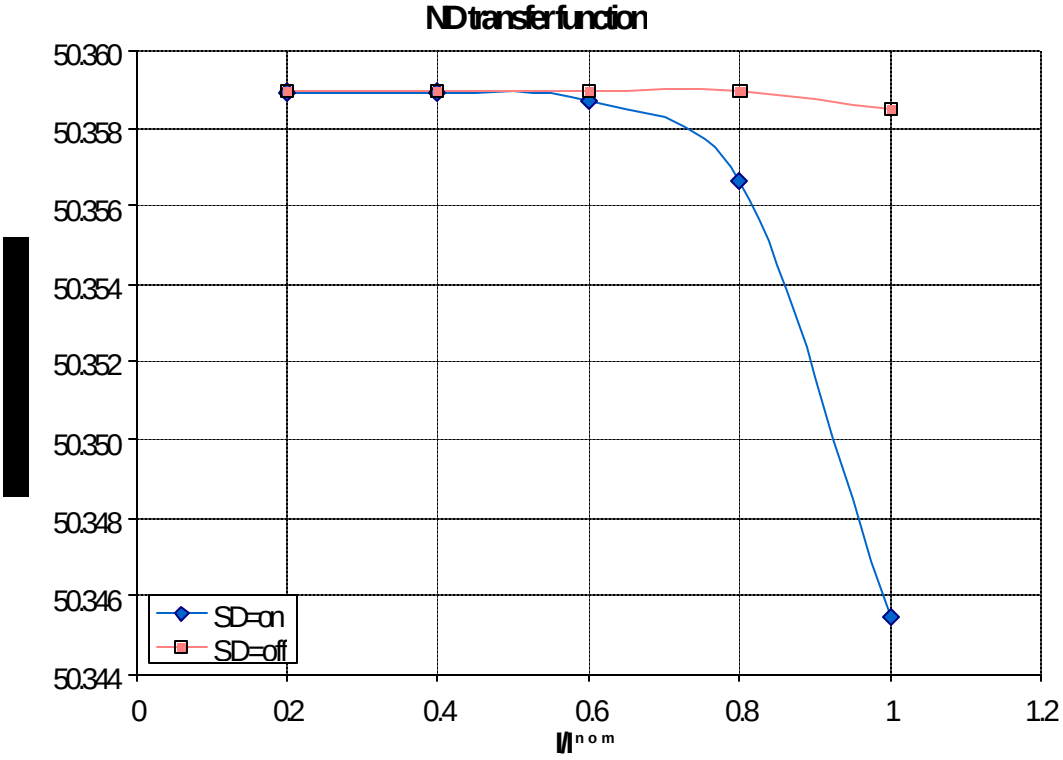
Effects:

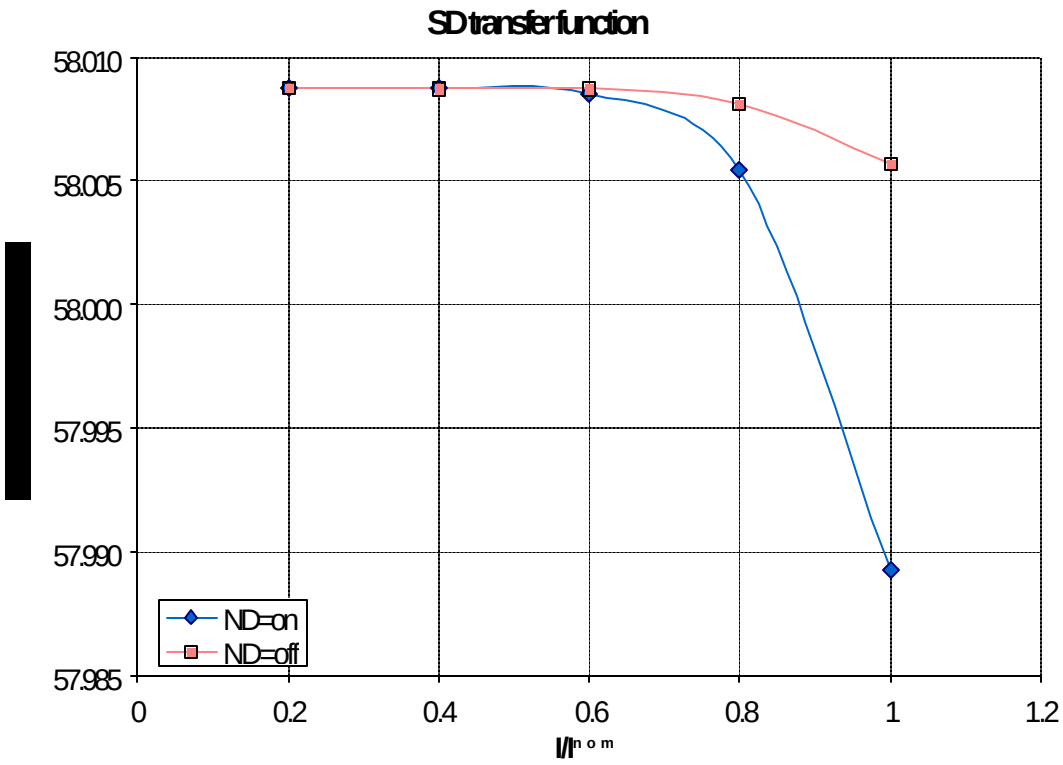
Normal sextupole +0.40 units
Skew sextupole -0.15 units
transfer functions
Normal dipole ~-3 units
Skew ~-4 units



Field in HD/VD corrector cross-section at nominal current in all windings (yoke OD=240 mm).


Normal and skew sextupole, ND=on, SD=on
b3
a3
0.50
0.40
0.30
0.20
0.10
0.00
-0.10
-0.20
0
0.2
0.4
0.6
0.8
1
1.2
I/Inom


ND transfer function
50.360
50.358
50.356
50.354
50.352
50.350
50.348
50.346
50.344
SD=on
SD=off
0
0.2
0.4
0.6
0.8
1
1.2
I/Inom


SD transfer function
58.010
58.005
58.000
57.995
57.990
57.985
0
0.2
0.4
0.6
0.8
1
1.2
I/I nom
ND=on
ND=off

HTS Leads

Test stand is cold; checkout is underway.

Miscellaneous

Bus design envelope is needed for spool design work.